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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Re: Patent Application of: Charles E. May
Serial No.: 09/943,196
Filed: August 30, 2001
For: Arrangement and Method for Fabricating A
Semiconductor Wafer
Group Art Unit: 1765
Examiner: Lynette T. Umez-Eronini
Our Docket No.: 01-146 (1003-0606)

#5
8/15/03
mw

Rule 1.131 Declaration of Charles E. May

1. I am the first and sole inventor of the subject matter of the above identified application "the Application", including the subject matter of claims 1-20 thereof.
2. I am currently employed by LSI Logic Corporation, having offices in Milpitas, California, and was employed by LSI Logic Corporation at the time I conceived and reduced to practice the subject matter of claims 1-8 and 12-14 of the Application.
3. I both conceived and reduced to practice the subject matter of claims 1-8 and 12-14 prior to May 22, 2001.
4. Attached as Exhibit A is a redacted copy of an LSI Logic Corporation invention disclosure form ("Invention Disclosure") that I submitted internally within LSI Logic Corporation to commence the patenting process of the invention described therein. I completed, signed and dated the Invention Disclosure prior to May 22, 2001.

5. With regard to claims 1 and 12, the Invention Disclosure clearly discusses the use of non-aqueous solvents in semiconductor polishing. With regard to claims 2 and 4, the Invention Disclosure discusses alternative embodiments in which the non-aqueous solvent *replaces* the aqueous rinse, and the other is to *include the non-aqueous solvent in the existing slurry*, which would include the aqueous rinse. I had reduced to practice other elements of claims 2 and 4 even though they were not specifically disclosed in the Invention Disclosure. With regard to claim 3, the Invention Disclosure states that the "rinse can be accomplished on the polish tool or on a separate tool". With regard to claims 5 and 6, the Invention Disclosure states "include an amount of non aqueous solvent in the slurry solution and gradually increase this content as the polish proceeds". With regard to claims 7, 8, 13 and 14, the Invention Disclosure describes various species of non-aqueous solvents including those recited in the claims. I used DMSO to describe dimethylsulfoxide.

6. To the extent that any elements of claims 1-8 and 12-14 are not specifically addressed in the Invention Disclosure, such elements constituted semiconductor polishing details known to me at the time I drafted the Invention Disclosure.

7. No working prototype of the invention was made prior to May 22, 2001, however, the invention was reduced to practice by me as I determined the details necessary to implement the invention prior to May 22, 2001.

8. In the alternative, I was diligent from the time I conceived the inventions described in claims 1-8 and 12-14 until the filing of the patent application on August 30, 2001.

Page 3 of 3

I hereby declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further, that these statements are made with the knowledge that willful false statements, and the like so made, are punishable by fine or imprisonment, or both, under Section 1001, Title 18 of the United States Code.



8-6-03

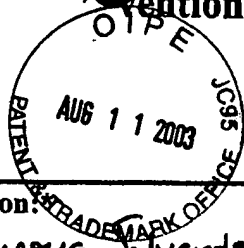
Charles E. May

LSI LOGIC

New Invention Disclosure Form

C. May 131 Dec.
Exn. A
(5 Pages)

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I. Title of Your Invention:

Use of Non Aqueous Solvents in Low k CMP

Was your invention first presented in an LSI Logic "Brainstorming Session?" (Y) ☒ (N) (unknown) (circle one)

If yes, specify the docket number assigned to you in the reminder e-mail:

II. List of All Inventors: (attach a separate sheet for additional inventors)

First Name*: Charles M.I. *: E Last Name*: MAY
 Home Address*: 4296 SE Augusta Loop Gresham OR 97080 Mail Stop*: A5110 Work Phone*:
 LSI Employee*: ☒ (Y) ☐ (N) (unknown) Vice President*: Richard Schudt Citizenship*: Work Fax*:
 If no, identify Employer*: Manager*: Richard Schmeller Hire Date: E-mail*: Cmay
 Job Title: Sr. Director Department: P.T.D. Home Phone:

First Name*: M.I. *: Last Name*:
 Home Address*: Mail Stop*: Work Phone*:
 LSI Employee*: Vice President*: Citizenship*: Work Fax*:
 (Y) (N) (unknown)
 If no, identify Employer*: Manager*: Hire Date: E-mail*:
 Job Title: Department: Home Phone:

First Name*: M.I. *: Last Name*:
 Home Address*: Mail Stop*: Work Phone*:
 LSI Employee*: Vice President*: Citizenship*: Work Fax*:
 (Y) ☒ (N) (unknown)
 If no, identify Employer*: Manager*: Hire Date: E-mail*:
 Job Title: Department: Home Phone:

First Name*: M.I. *: Last Name*:
 Home Address*: Mail Stop*: Work Phone*:
 LSI Employee*: Vice President*: Citizenship*: Work Fax*:
 (Y) (N) (unknown)
 If no, identify Employer*: Manager*: Hire Date: E-mail*:
 Job Title: Department: Home Phone:

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LSI LOGIC CORP.
INTELLECTUAL PROPERTY DEPT.

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III. Public Disclosure of Your Invention:

1. Was your Invention ever disclosed, either orally or in writing to anyone other than an LSI Logic employee*? (Y) (~~N~~) (unknown)
2. If yes to 1, specify the date(s) of disclosure*:
3. Are there plans to disclose your Invention in the future*? (Y) (~~N~~) (unknown)
4. If yes to 3, specify the date(s) of expected disclosure*:

IV. Use of Your Invention:

1. Has your Invention been used*? (Y) (~~N~~) (unknown)
2. If yes to 1, specify the date(s) of use*:
3. Are there plans to use your Invention in the future*? (~~Y~~) (N) (unknown)
4. If yes to 3, specify the date(s) of expected use*: 2002

V. Invention "offered for" or "on sale":

1. Was a product or process containing your Invention "offered for sale" or "sold*"? (Y) (~~N~~) (unknown)
2. If yes to 1, specify the date(s) of the offer or sale*:

VI. Prior Art: (attach separate sheets if necessary) List only those patents, products, processes, journal articles, presentations, conferences, seminars, and other knowledge that you are aware of*, that are related to the subject matter of your Invention: (you have no duty to conduct a search)

Author/Event/Product/Process:

Title:

Date:

- 1.
- 2.
- 3.
- 4.

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VII. Background to Your Invention: (attach separate sheets with your responses)

Describe: *One of the main issues in Polych Planarization in the Copper area is the removal of Slurry and Reaction Products. (see attached)*

1. The field to which your Invention pertains.* *SEMICONDUCTOR PROCESSING*
2. Problem(s) in the field which motivated your need to invent.* *SLURRY and Reaction Products removal*
3. Current approaches toward solving those problems (if any).* *Scrub and Rinse*
4. Why those current approaches are unacceptable.* *Not completely effective*

VIII. Detailed Description of Your Invention: (attach separate sheets with your responses)

See attached.

1. Provide enough information and detail so that another person in your field could make and use your Invention*.
- If available, supplement your description with any existing reports, presentations, e-mails, sketches, drawings, schematics, photos, etc.
At least one simple Figure or Flowchart of your Invention MUST be included*.
2. Identify the new features of your Invention*.
3. List the advantages of your Invention*.
4. Disclose alternate ways of making and using of your Invention.

IX. Date of Your Invention:

1. Specify the date when you first conceived of your Invention*: (e.g. the conception date) *10/22/00*
2. Specify the date the first prototype was built*: (e.g. reduction to practice)

X. Customer/Vendor Contracts:

1. Was your Invention developed during performance of a customer/vendor contract*? (Y) (~~N~~) (unknown)

XI. Government March-In Rights:



1. Was your Invention conceived during performance of government contract*? (Y) (~~N~~) (unknown)

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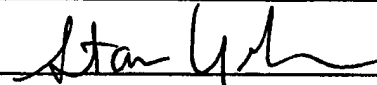
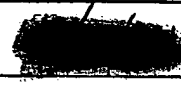
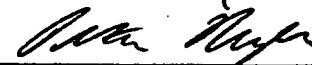

XII. Signatures*: (sign only in BLUE ink)

We the aforementioned inventors submit in confidence this Invention disclosure to Attorneys within the LSI Logic Legal Dept. for the purpose of obtaining a legal opinion and/or legal advice as to the availability of patent, trade secret, and/or copyright protection for, and/or a general legal opinion or legal advice relating to the material contained within.

I(We) believe myself(ourselves) to be the first and original inventor(s) of this Invention:

	Inventor	Date:
1.	Charles E. May 	
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Two Witnesses who have read and understood this Invention disclosure*:

	Full Name of Witness (Print and Sign Name)	Date:
1.	STAN YEHL 	
2.	Peter Wagner 	

The information within in this form has been provided to the LSI Logic Legal Department attorneys for the purpose of obtaining either a legal opinion, legal services, and/or assistance in a legal proceeding, and hence is privileged as an attorney-client communication.

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One of the main issues in polishing planarization in the prep area is the removal of slurry residue and the reaction product. The current process involves the use of aqueous based solutions and rinses. The main issue with these methods is the limited solubility of the slurry and reaction products in these solutions. There are two main ideas in this disclosure. One is to replace the aqueous rinse with a rinse that contains a non aqueous polar solvent that would dissolve the residue and reaction products while leaving the dielectric and underlying metal intact. The second is to include an amount of non aqueous solvent in the slurry solution and gradually increase this content as the polish proceeds. The end result in either case is a cleaner surface that will improve uniformity and yields.

The rinse can be accomplished on the polish tool or on a separate tool. This approach can be used to insure that the copper is completely removed in the regions between conductors and remains in those areas where it is needed.

Examples of nonaqueous solvents include but are not limited to DMSO, Nnpropanalamide, complex organic amines that will attack oxidized Copper